L2

Troubleshooting VLANs and Trunks

Objectives

In this lab you will download configuration files into PxSW's running configuration to introduce VLAN and trunking issues within your pod, which you will then diagnose and correct.

The objectives for this lab are:

- Shutdown the router links to the core and enable a switch link to the core; configure that link as a trunk.

- Load several files that cause configuration problems, one at a time.

- Diagnose and correct the problems; verify your fixes.

Important   Substitute your pod number for x and the router number for y in all instructions and commands.

The passwords configured on the devices at this point are:

- Console and vty access: username: **ccna**, password: **cisco**

- enable secret: **sanfran**

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Lab Topology

The following diagram illustrates the logical topology used in this lab, along with the IP addresses configured.
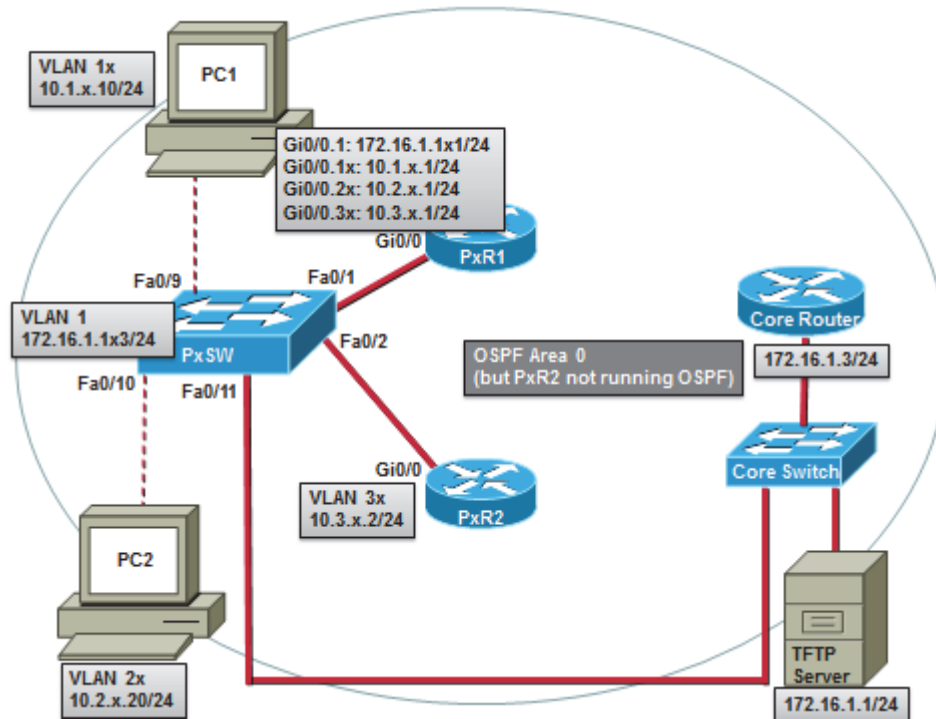
Command List

The following table lists the commands used in this lab, in alphabetical order.

Cisco IOS Commands Used In This Lab

Command	Description
`#clear arp-cache`	Clears the ARP cache on a switch.
`#configure terminal`	Enters global configuration mode.
`#copy running-config startup-config`	Saves the running configuration (in RAM) into the startup configuration (in NVRAM).
`#copy tftp running-config`	Merges the contents of a file on a TFTP server into the running configuration (in RAM)
`>enable`	Enters the EXEC privileged mode.
`(config)#end`	Terminates configuration mode.
`#exit`	Exit the current mode and go up one level.
`(config)#interface type number`	Enters interface configuration mode.

`(config)#interface` *`type number.subinterface`*	Enters configuration mode for the subinterface.
`(config-if)#[no] ip address` *`address mask`*	Assigns interface IP address and subnet mask. With the **no** keyword removes the address from the interface.
`(config)#`**`ip default-gateway`** *`address`*	Configures the specified IP address as the default gateway for the switch.
`(config-vlan)#`**`name`** *`name`*	Assigns a name to a VLAN.
`(config-router)#[no] network` *`address wildcard-mask`* **`area`** *`area`*	Specifies which interfaces run OSPF and in which area. With the **no** parameter, removes the interface from running OSPF in the area.
`#`**`ping`** *`address`*	Sends an echo request to the specified address
`(config)#`**`router ospf`** *`process-id`*	Configures an OSPF routing process.
`#`**`show interfaces`** [*`type number`*]	Displays info about an interface.
`#`**`show interface status`**	Displays status of switch interfaces.
`#`**`show interfaces`** [*`type number`*] **`switchport`**	Displays switchport info about an interface.
`#`**`show interfaces`** [*`type number`*] **`trunk`**	Displays trunking info about an interface.
`#`**`show ip interface brief`**	Displays info about the active IP interfaces.
`#`**`show vlan id`** *`vlan`*	Displays information about the specified VLAN.
`(config-if)#[no] shutdown`	Disables the specified interface. With the **no** parameter, enables the interface.
`(config-if)#`**`switchport mode`** *`mode`*	Sets trunking mode of an interface.
`(config-if)#`**`switchport trunk allowed vlan`** *`vlan-list`*	Sets VLAN allowed list on an trunk interface.
`(config)#`**`vlan`** *`vlan`*	Creates a VLAN.

Windows Commands Used In This Lab

Command	**Description**
`ping` *`address`*	Causes an ICMP echo message to be sent to the destination, which should cause an ICMP echo reply message to be returned.

Procedure

In this lab, you will download config files into PxSW to introduce VLAN and trunking problems within your pod, which you will then diagnose and correct.

Note	This lab requires that the previous lab was completed correctly. If you have any doubts, reset to this lab, as described in "Lab 0: Introduction, and Connecting to and Using the Remote Lab Environment".

Note	The Appendix "Troubleshooting Scenarios" provides information about each of the troubleshooting files; refer to this appendix if you need assistance during this lab.

Prepare pod devices

The configuration files that you will download are on the core TFTP server. For this lab, you will download them via the core switch. The TFTP server's address is 172.16.1.1, in VLAN 1 on the core switch. To access the files, you will first shutdown the router links to the core and enable a switch link to the core, which you will configure as a trunk. You will also need to change the PxSW and PxR1 VLAN 1 addresses to be on the same subnet as the TFTP server.

1. Connect to PxR1 and enter configuration mode. Disable PxR1's GigabitEthernet 0/1 interface to the core.

```
PxR1#configure terminal
PxR1(config)#interface gi0/1
PxR1(config-if)#shutdown
PxR1(config-if)#exit
```

2. Change the address on PxR1's GigabitEthernet 0/0.1 subinterface to 172.16.1.1x1/24, where x is your pod number.

```
PxR1(config)#interface gi0/0.1
PxR1(config-subif)#ip address 172.16.1.1x1 255.255.255.0
PxR1(config-subif)#exit
```

3. Change the OSPF process 1 configuration on PxR1 to route over the 172.16.1.0/24 subnet for area 0, and not route over the 10.10.x.0/24 subnet for area 0. PxR1 will exchange routes with the core router, via the pod switch and the core switch.

```
PxR1(config)#router ospf 1
PxR1(config-router)#network 172.16.1.0 0.0.0.255 area 0
PxR1(config-router)#no network 10.10.x.0 0.0.0.255 area 0
PxR1(config-router)#end
```

4.   Connect to PxR2. Confirm that its GigabitEthernet 0/1 interface to the core is shutdown.

```
PxR2#show interface gi0/1
GigabitEthernet0/1 is administratively down, line protocol is down
  Hardware is CN Gigabit Ethernet, address is acf2.c583.2121 (bia acf2.c583.2121
)
```

5.   Connect to PxSW and enter configuration mode. Change PxSW's address in VLAN 1 to 172.16.1.1x3/24 and change its default gateway to the new address on PxR1, 172.16.1.1x1. In all addresses, x is your pod number.

```
PxSW#configure terminal
PxSW(config)#interface vlan 1
PxSW(config-if)#ip address 172.16.1.1x3 255.255.255.0
PxSW(config-if)#exit
PxSW(config)#ip default-gateway 172.16.1.1x1
```

6.   Configure PxSW's interface FastEthernet 0/11,connected to the core switch, as a trunk and allow only the pod VLANs 1, 1x, 2x, and 3x on the trunk. Enable the interface.

```
PxSW(config)#interface fastethernet 0/11
PxSW(config-if)#switchport mode trunk
PxSW(config-if)#switchport trunk allowed vlan 1,1x,2x,3x
PxSW(config-if)#no shutdown
PxSW(config-if)#end
```

Note   In the **switchport trunk allowed vlan** command you cannot put spaces in the list of VLAN numbers.

---

7.   On the switch, clear the ARP cache.

```
PxSW#clear arp-cache
```

8.   From your switch ping the TFTP server (172.16.1.1, reached via the core switch), PxR2, and both PCs, to verify connectivity. All pings should be successful.

```
PxSW#ping 172.16.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/8 ms
PxSW#ping 10.3.x.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.3.x.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/8 ms
PxSW#ping 10.1.x.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.x.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/203/1007 ms
PxSW#ping 10.2.x.20
```

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.2.x.20, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/9 ms
PXSW#
```

9. Connect to PC1 and PC2. From PC1 and PC2, ping the TFTP server (172.16.1.1), to verify connectivity. All pings should be successful.

Here's PC1 pinging the TFTP server:

```
C:\Users\adom>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:
Reply from 172.16.1.1: bytes=32 time=2ms TTL=62
Reply from 172.16.1.1: bytes=32 time=1ms TTL=63
Reply from 172.16.1.1: bytes=32 time<1ms TTL=63
Reply from 172.16.1.1: bytes=32 time<1ms TTL=63

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\Users\adom>_
```

Here's PC2 pinging the TFTP server:

```
C:\Users\adom>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:
Reply from 172.16.1.1: bytes=32 time=1ms TTL=62
Reply from 172.16.1.1: bytes=32 time=1ms TTL=63
Reply from 172.16.1.1: bytes=32 time=1ms TTL=63
Reply from 172.16.1.1: bytes=32 time=1ms TTL=63

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Users\adom>
```

Download the first problem file to the switch

10. On your switch, download the file "VLAN-a.txt" from the TFTP server (172.16.1.1) into the running config (don't forget the suffix of "txt"):

```
PxSW#copy tftp running-config
Address or name of remote host []? 172.16.1.1
Source filename []? VLAN-a.txt
Destination filename [running-config]?
Accessing tftp://172.16.1.1/VLAN-a.txt...
Loading VLAN-a.txt from 172.16.1.1 (via Vlan1): !
[OK - 394 bytes]
```

```
394 bytes copied in 8.095 secs (49 bytes/sec)
PxSW#
```

> The command merges the contents of a file on a TFTP server into the running configuration.

> If the copy was successful, you will receive the "OK", followed by the file size and some statistics regarding the time and transfer rate. If the copy was unsuccessful, you will see a message similar to this:

> %Error opening tftp://172.16.1.1/VLAN-a.txt (*cause of error condition*)

> If an error message occurs, troubleshoot your configuration, and then retry the download.

Note   Do not pass this point until you have successfully downloaded the problem file from the TFTP server into the switch's running config.

Verify connectivity

11. Attempt the pings again to verify connectivity: From your switch ping the TFTP server (172.16.1.1) and both PCs, and from PC1 and PC2, ping the TFTP server.

```
PxSW#ping 172.16.1.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 172.16.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/9 ms
PxSW#ping 10.1.x.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.x.10, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/8 ms
PxSW#ping 10.2.x.20

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.2.x.20, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
PxSW#
```

Here's PC1 pinging the TFTP server:

```
C:\Users\adom>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:
Reply from 172.16.1.1: bytes=32 time=1ms TTL=62
Reply from 172.16.1.1: bytes=32 time=1ms TTL=62
Reply from 172.16.1.1: bytes=32 time<1ms TTL=63
Reply from 172.16.1.1: bytes=32 time<1ms TTL=63

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\adom>
```

Here's PC2 attempting to ping the TFTP server:

```
C:\Users\adom>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:
Reply from 10.2.6.20: Destination host unreachable.
Reply from 10.2.6.20: Destination host unreachable.
Reply from 10.2.6.20: Destination host unreachable.
Reply from 10.2.6.20: Destination host unreachable.

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

C:\Users\adom>
```

The pings to and from PC2 are not successful this time. This problem might have been reported to you by a user on PC2, saying, for example, that they can no longer connect to the network. Now you have a problem to diagnose and solve!

Diagnose the problem

12. In this case, because of the TFTP transfer, we know that the problem is within the running config of your pod's switch. Because the running config of the switch is relatively small (two pages or so), a reasonable approach to troubleshooting might be to simply view the switch's running config ("show run"), and look for problems. This approach is not scalable in general, because in the real world the problem usually isn't caused by downloading a file for the specific purpose of breaking the config. Instead, you could be faced with configs that are ten or more pages long, and a trouble ticket that says "it doesn't work" (giving you no idea where to start). Therefore, instead of "show run", we might approach things by using some switch-related commands in an attempt to localize the problem. In this first switch troubleshooting exercise, you'll be "led by the hand" to get a feel for the process.

13. As an aid to troubleshooting, ask yourself the following questions:

    13.1.   Did it ever work?

    13.2.   Was anything changed?

    13.3.   What are the symptoms?

    13.4.   What could reasonably cause these symptoms?

14. The answers to the questions above are:

    14.1.   Did it ever work? Yes, earlier in the lab.

    14.2.   Was anything changed? Yes, a running config.

    14.3.   What are the symptoms? Can't ping to or from PC2.

    14.4.   What could reasonably cause these symptoms? Let's find out …

15. Let's start with the status of the connections. You can use the **show interface status** or **show ip interfaces brief** command to see information about all of the interfaces at once.

```
PxSW#show interfaces status

Port       Name                 Status       Vlan       Duplex  Speed Type
Fa0/1                           connected    trunk      a-full  a-100 10/100BaseTX
Fa0/2                           connected    3x         a-full  a-100 10/100BaseTX
Fa0/3                           notconnect   1          auto    auto 10/100BaseTX
Fa0/4                           notconnect   1          auto    auto 10/100BaseTX
Fa0/5                           notconnect   1          auto    auto 10/100BaseTX
Fa0/6                           notconnect   1          auto    auto 10/100BaseTX
Fa0/7                           notconnect   1          auto    auto 10/100BaseTX
Fa0/8                           notconnect   1          auto    auto 10/100BaseTX
Fa0/9                           connected    1x         a-half  a-100 10/100BaseTX
Fa0/10                          connected    2x         a-half  a-100 10/100BaseTX
Fa0/11                          connected    trunk      a-full  a-100 10/100BaseTX
Fa0/12                          disabled     1          auto    auto 10/100BaseTX
<output omitted>

PxSW#show ip interfaces brief
Interface            IP-Address      OK? Method Status                Protocol
Vlan1                172.16.1.1x3    YES manual up                    up
FastEthernet0/1      unassigned      YES unset  up                    up
FastEthernet0/2      unassigned      YES unset  up                    up
FastEthernet0/3      unassigned      YES unset  down                  down
FastEthernet0/4      unassigned      YES unset  down                  down
FastEthernet0/5      unassigned      YES unset  down                  down
FastEthernet0/6      unassigned      YES unset  down                  down
FastEthernet0/7      unassigned      YES unset  down                  down
FastEthernet0/8      unassigned      YES unset  down                  down
FastEthernet0/9      unassigned      YES unset  up                    up
FastEthernet0/10     unassigned      YES unset  up                    up
```

```
FastEthernet0/11        unassigned      YES unset  up                        up
FastEthernet0/12        unassigned      YES unset  administratively down down
<output omitted>
```

Does anything seem unusual about this? Are the appropriate interfaces "connected"? Is FastEthernet 0/1 (to PxR1) trunking? Is FastEthernet 0/2 (to PxR2) an access port on VLAN 3x? Is FastEthernet 0/9 (to PC1) an access port on VLAN1x, and is FastEthernet 0/10 (to PC2) an access port on VLAN2x? Is FastEthernet Fa0/11 still connected and trunking? The answers to these questions should be "yes". If so, there's no problem there.

16. Examine the status of the switch's interface to PC2; PC2 is connected to FastEthernet 0/10.

```
PxSW#show interfaces Fa0/10
FastEthernet0/10 is up, line protocol is up (connected)
  Hardware is Fast Ethernet, address is 2401.c70f.4d8a (bia 2401.c70f.4d8a)
<output omitted>
```

The interface is up and up, so it looks ok.

17. View the switch's VLAN database.

```
PxSW#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/3, Fa0/4, Fa0/5, Fa0/6
                                                Fa0/7, Fa0/8, Fa0/12, Fa0/13
                                                Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                                Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                                Fa0/22, Fa0/23, Fa0/24, Gi0/1
                                                Gi0/2
1x   VLAN1x                           active    Fa0/9
3x   VLAN3x                           active    Fa0/2
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
<output omitted>
PxSW#
```

Where's FastEthernet 0/1? What about FastEthernet 0/10 and 0/11? Why don't they appear?

In the case of FastEthernet 0/1 and 0/11, it's because they are trunks, and therefore not associated with (not an access port on) any particular VLAN.

18. View the switch's FastEthernet 0/1 and 0/11 trunking status. It should say that the status is "trunking". If so, these interfaces are not the problem.

```
PxSW#show interface fastethernet 0/1 trunk

Port        Mode             Encapsulation  Status        Native vlan
Fa0/1       on               802.1q         trunking      1

Port        Vlans allowed on trunk
Fa0/1       1,1x,2x,3x
```

```
Port          Vlans allowed and active in management domain
Fa0/1         1,1x,3x

Port          Vlans in spanning tree forwarding state and not pruned
Fa0/1         1,1x,3x
PxSW#show interface fastethernet 0/11 trunk

Port          Mode                 Encapsulation  Status       Native vlan
Fa0/11        on                   802.1q         trunking     1

Port          Vlans allowed on trunk
Fa0/11        1,1x,2x,3x

Port          Vlans allowed and active in management domain
Fa0/11        1,1x,3x

Port          Vlans in spanning tree forwarding state and not pruned
Fa0/11        1,1x,3x
PxSW#
```

19.   So where then is FastEthernet 0/10? View the switch's FastEthernet 0/10 trunking status.

```
PxSW#show interface fastethernet 0/10 trunk

Port          Mode                 Encapsulation  Status       Native vlan
Fa0/10        auto                 802.1q         not-trunking 1

Port          Vlans allowed on trunk
Fa0/10        2x

Port          Vlans allowed and active in management domain
Fa0/10        none

Port          Vlans in spanning tree forwarding state and not pruned
Fa0/10        none
PxSW#
```

> This interface's mode is "auto" (that's the default), and the status is "not-trunking", just as we'd expect, because we did not configure FastEthernet 0/10 to trunk (it was configured for access mode). But if it's not trunking, and it's not appearing in the VLAN database, what is it doing?

20.   View the switch's FastEthernet 0/10 switchport status.

```
PxSW#show interface fastethernet 0/10 switchport
Name: Fa0/10
Switchport: Enabled
Administrative Mode: dynamic auto
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: On
Access Mode VLAN: 2x (Inactive)
Trunking Native Mode VLAN: 1 (default)
Administrative Native VLAN tagging: enabled
Voice VLAN: none
<output omitted>
```

The switch's FastEthernet 0/10 is supposed to be an access port active on VLAN 2x (where x is your pod number). It is on the correct VLAN, but the VLAN is "Inactive".

21. Let's take a look at VLAN 2x in the switch's database:

```
PxSW#show vlan id 2x
VLAN id 2x not found in current VLAN database
PxSW#
```

That's interesting … VLAN 2x is "not found". That could be the problem. Remember that a port assigned to a non-existent VLAN is rendered inoperable, and FastEthernet 0/10 is currently assigned to VLAN 2x.

Correct the problem

22. Recreate VLAN 2x, name it "VLAN2x" (where "x" is your pod number), and leave config mode.

```
PxSW#configure terminal
PxSW(config)#vlan 2x
PxSW(config-vlan)#name VLAN2x
PxSW(config-vlan)#end
```

23. View the switch's VLAN database.

```
PxSW#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/3, Fa0/4, Fa0/5, Fa0/6
                                                Fa0/7, Fa0/8, Fa0/12, Fa0/13
                                                Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                                Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                                Fa0/22, Fa0/23, Fa0/24, Gi0/1
                                                Gi0/2
1x   VLAN1x                           active    Fa0/9
2x   VLAN2x                           active    Fa0/10
3x   VLAN3x                           active    Fa0/2
1002 fddi-default                     act/unsup
1003 token-ring-default               act/unsup
1004 fddinet-default                  act/unsup
1005 trnet-default                    act/unsup
<output omitted>
PxSW#
```

FastEthernet 0/10 should appear in VLAN 2x, as expected.

Verify connectivity

24. Try to ping PC2 from the switch and try to ping the TFTP server (172.16.1.1) from PC2 again.
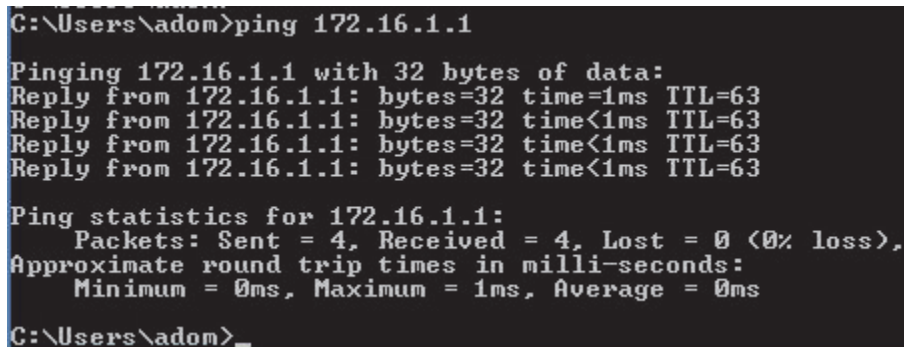
```
PxSW#ping 10.2.x.20

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.2.x.20, timeout is 2 seconds:
```

```
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/4/9 ms
PxSW#
```

Here's PC2 pinging the TFTP server:

```
C:\Users\adom>ping 172.16.1.1

Pinging 172.16.1.1 with 32 bytes of data:
Reply from 172.16.1.1: bytes=32 time=1ms TTL=63
Reply from 172.16.1.1: bytes=32 time<1ms TTL=63
Reply from 172.16.1.1: bytes=32 time<1ms TTL=63
Reply from 172.16.1.1: bytes=32 time<1ms TTL=63

Ping statistics for 172.16.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\adom>_
```

The pings should be successful. If not, troubleshoot your configurations.

Note	After correcting the problem, you may have to wait a minute, or try the pings a couple of times, before they work.

Note	Do not pass this point until you have verified that the switch's configuration has been corrected.

Download additional problem files

25. There are additional switch problem files:

- VLAN-b.txt

- VLAN-c.txt

- VLAN-d.txt

- VLAN-e.txt

- VLAN-f.txt

- VLAN-g.txt

- VLAN-h.txt

Important   There are eight files in total; you may not have time to do all of them in class.

Important   Recall that the Appendix "Troubleshooting Scenarios" provides information about each of the troubleshooting files. If after a few minutes you cannot discover the problem, we suggest looking at this appendix for assistance.

---

26. Download a problem file into the switch's running config, then troubleshoot and correct the problem. Only download one file at a time! When downloading, don't forget the "txt" suffix:

```
PxSW#copy tftp running-config
Address or name of remote host [172.16.1.1]?
Source filename [VLAN-a.txt]? VLAN-b.txt        !or whatever file you are loading
Destination filename [running-config]?
Accessing tftp://172.16.1.1/VLAN-b.txt...
Loading VLAN-b.txt from 172.16.1.1 (via Vlan1): !
[OK - 338 bytes]

338 bytes copied in 8.036 secs (42 bytes/sec)
PxSW#
```

27. After you've successfully downloaded the file, attempt the pings again to verify connectivity: From your switch ping the TFTP server (172.16.1.1), PxR2, and both PCs; and from PC1 and PC2, ping the TFTP server. For some of the problems these pings will still work, but some of the interfaces may not be working correctly; verify that all interfaces are in the correct state.

28. Determine what the problem is, troubleshoot and correct the problem. You may find the following commands helpful:

- **show interface *type number* switchport**

- **show interface *type number* trunk**

- **show interface status**

- **show interface vlan 1**

- **show ip interface brief**

- **show vlan [id *number*]**

- **ping *destination***

- **trace *destination***

Note	After correcting the problem, you may have to wait a minute, or try the pings a couple of times, before they work.

Note	Do not pass this point until you have verified that the switch's configuration has been corrected.

Save the configurations

29. Save all of your pod device configurations to startup-config.

```
PxSW#copy running-config startup-config
PxR1#copy running-config startup-config
PxR2#copy running-config startup-config
```

Lab Complete

Completed Configuration

Your configuration should be similar to the example below.

PC1 has address 10.1.x.10, with subnet mask 255.255.255.0. Its default gateway is set to 10.1.x.1.

PC2 has address 10.2.x.20, with subnet mask 255.255.255.0. Its default gateway is set to 10.2.x.1.

Note	These example configurations include **no shutdown** commands on some interfaces and the **crypto key generate rsa modulus 1024** command. You will not see these commands in the output of the **show running-config** command. In the PxSW configuration you will also see more detail in the **crypto pki certificate** section in the output of the **show running-config** command.

PxSW:

```
version 15.0
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname PxSW
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$MwWB$mlGhntn.NW88DZkZ6Bu5E0
!
username ccna secret 5 $1$4ply$OXbD45OeKajioPlV5EHdQ0
no aaa new-model
system mtu routing 1500
vtp mode transparent
!
!
no ip domain-lookup
ip domain-name cisco.com
!
crypto key generate rsa modulus 1024
!
crypto pki trustpoint TP-self-signed-3339668864
 enrollment selfsigned
 subject-name cn=IOS-Self-Signed-Certificate-3339668864
 revocation-check none
 rsakeypair TP-self-signed-3339668864
!
!
crypto pki certificate chain TP-self-signed-3339668864
```

```
 certificate self-signed 01 nvram:IOS-Self-Sig#5.cer
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
vlan 1x
 name VLAN1x
!
vlan 2x
 name VLAN2x
!
vlan 3x
 name VLAN3x
!
ip ssh version 2
!
!
!
!
!
interface FastEthernet0/1
 switchport trunk allowed vlan 1,1x,2x,3x
 switchport mode trunk
!
interface FastEthernet0/2
 switchport access vlan 3x
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
 switchport access vlan 1x
!
interface FastEthernet0/10
 switchport access vlan 2x
!
interface FastEthernet0/11
 switchport trunk allowed vlan 1,1x,2x,3x
 switchport mode trunk
!
interface FastEthernet0/12
 shutdown
!
interface FastEthernet0/13
!
```

```
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 172.16.1.1x3 255.255.255.0
 no shutdown
!
ip default-gateway 172.16.1.1x1
ip http server
ip http secure-server
logging esm config
!
line con 0
 exec-timeout 60 0
 logging synchronous
 login local
line vty 0 4
 exec-timeout 60 0
 logging synchronous
 login local
 transport input ssh
line vty 5 15
 exec-timeout 60 0
 logging synchronous
 login local
 transport input ssh
!
end
```

PxR1:

```
version 15.2
service timestamps debug datetime msec
```

```
service timestamps log datetime msec
no service password-encryption
!
hostname PxR1
!
boot-start-marker
boot-end-marker
!
!
enable secret 4 NUtXpRU892oGmKT2hPuxM6rMJlDMKfYF3czf8T.rrWA
!
no aaa new-model
!
ip cef
!
!
!
!
!
!
no ip domain lookup
ip domain name cisco.com
ipv6 unicast-routing
ipv6 cef
multilink bundle-name authenticated
!
!
!
!
license udi pid CISCO2901/K9 sn FTX170480E4
!
crypto key generate rsa modulus 1024
!
username ccna secret 4 tnhtc92DXBhelxjYk8LWJrPV36S2i4ntXrpb4RFmfqY
!
!
ip ssh version 2
csdb tcp synwait-time 30
csdb tcp idle-time 3600
csdb tcp finwait-time 5
csdb tcp reassembly max-memory 1024
csdb tcp reassembly max-queue-length 16
csdb udp idle-time 30
csdb icmp idle-time 10
csdb session max-session 65535
!
!
!
!
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
!
interface GigabitEthernet0/0
 no ip address
 speed auto
 duplex auto
 no shutdown
```

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```
!
interface GigabitEthernet0/0.1
 encapsulation dot1Q 1 native
 ip address 172.16.1.1x1 255.255.255.0
 ipv6 address 2001:DB8:10:x::1/64
 no shutdown
!
interface GigabitEthernet0/0.1x
 encapsulation dot1Q 1x
 ip address 10.1.x.1 255.255.255.0
 ip access-group 100 in
 ipv6 address 2001:DB8:1:x::1/64
 no shutdown
!
interface GigabitEthernet0/0.2x
 encapsulation dot1Q 2x
 ip address 10.2.x.1 255.255.255.0
 ip access-group 100 in
 ipv6 address 2001:DB8:2:x::1/64
 no shutdown
!
interface GigabitEthernet0/0.3x
 encapsulation dot1Q 3x
 ip address 10.3.x.1 255.255.255.0
 ipv6 address 2001:DB8:3:x::1/64
 no shutdown
!
interface GigabitEthernet0/1
 ip address 192.168.xx.1 255.255.255.0
 shutdown
 speed auto
 duplex auto
 ipv6 address autoconfig
!
interface Serial0/0/0
 no ip address
 shutdown
!
interface Serial0/0/1
 no ip address
 shutdown
!
router ospf 1
 router-id 1.1.x.1
 network 10.1.x.0 0.0.0.255 area 0
 network 10.2.x.0 0.0.0.255 area 0
 network 10.3.x.0 0.0.0.255 area 0
 network 172.16.1.0 0.0.0.255 area 0
 network 192.168.xx.0 0.0.0.255 area 0
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
!
access-list 100 deny    tcp host 10.1.x.10 host 192.168.xx.3 eq telnet
access-list 100 deny    tcp host 10.2.x.20 host 192.168.xx.3 eq telnet
```

```
access-list 100 permit ip any any
ipv6 route ::/0 GigabitEthernet0/1 2001:DB8:168:xx::3
!
!
!
control-plane
!
!
!
line con 0
 exec-timeout 60 0
 logging synchronous
 login local
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 exec-timeout 60 0
 logging synchronous
 login local
 transport input ssh
line vty 5 15
 exec-timeout 60 0
 logging synchronous
 login local
 transport input ssh
!
scheduler allocate 20000 1000
!
end
```

PxR2:

```
version 15.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname PxR2
!
boot-start-marker
boot-end-marker
!
!
enable secret 4 NUtXpRU892oGmKT2hPuxM6rMJlDMKfYF3czf8T.rrWA
!
no aaa new-model
!
ip cef
!
!
```

```
!
!
!
!
no ip domain lookup
ip domain name cisco.com
ipv6 unicast-routing
ipv6 cef
multilink bundle-name authenticated
!
!
!
!
license udi pid CISCO2901/K9 sn FTX170480EA
!
crypto key generate rsa modulus 1024
!
username ccna secret 4 tnhtc92DXBhelxjYk8LWJrPV36S2i4ntXrpb4RFmfqY
!
!
ip ssh version 2
csdb tcp synwait-time 30
csdb tcp idle-time 3600
csdb tcp finwait-time 5
csdb tcp reassembly max-memory 1024
csdb tcp reassembly max-queue-length 16
csdb udp idle-time 30
csdb icmp idle-time 10
csdb session max-session 65535
!
!
!
!
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
!
interface GigabitEthernet0/0
 ip address 10.3.x.2 255.255.255.0
 speed auto
 duplex auto
 ipv6 address 2001:DB8:3:x::2/64
 no shutdown
!
interface GigabitEthernet0/1
 no ip address
 shutdown
 speed auto
 duplex auto
!
interface Serial0/0/0
 no ip address
 shutdown
 clock rate 2000000
!
interface Serial0/0/1
 no ip address
 shutdown
```

```
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.3.x.1
!
ipv6 route ::/0 GigabitEthernet0/0 2001:DB8:3:x::1
!
!
!
control-plane
!
!
!
line con 0
 exec-timeout 60 0
 logging synchronous
 login local
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport input all
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 exec-timeout 60 0
 logging synchronous
 login local
 transport input ssh
line vty 5 15
 exec-timeout 60 0
 logging synchronous
 login local
 transport input ssh
!
scheduler allocate 20000 1000
!
end
```

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